ABSTRACT OF THE DISCLOSURE

Metallic layer components for use in a direct oxidation fuel cell are disclosed. A direct oxidation fuel cell includes a membrane electrode assembly having an anode face and a cathode face. An anodic diffusion layer is associated with the anode face and a cathodic diffusion layer is associated with the cathode face. The metallic diffusion layers, in accordance with one embodiment of the invention include pores formed in the diffusion layer to allow substances to flow through the diffusion layer to the membrane electrolyte and back out again. Another embodiment of the invention incorporates metallic layer components that are formed using particle diffusion bonding techniques and are then coated with hydorphilic or hydrophobic substances to control reactant flow and transport. The metallic layers may also perform the function of flow field plates that not only direct the flow of substances to and from the membrane, but also conduct the electrons and thus the electricity generated by the cell.